The Vegetation of Banks Peninsula: Supplement 1.

By Robert M. Laing, M.A., B.Sc., F.N.Z.Inst., and A. Wall, M.A., Professor of English, Canterbury College, Christchurch.

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This paper contains (1) an account of the forest in Price's Valley, perhaps the only remnant of any importance of the lowland forests of the peninsula; (2) a list of such plants (about thirty) as have been found for the first time on Banks Peninsula since the original paper was published, together with the names of those that have to be removed from the *species inquirendae* or *species excludendae* and added to the list of still existing species; (3) a list of such new habitats discovered by us as seem worthy to be put on record. The list does not include such habitats as have been recorded by other observers since the original paper was written. Few dicotyledons have been added, showing that the original list of these was nearly complete.

The abbreviations of collectors' names is as before:—

A. W.	..	Professor A. Wall.
W. M.	..	Mr. William Martin.
R. M. L.	..	Mr. R. M. Laing.
L. C.	..	Dr. L. Cockayne, F.R.S.

I. THE FOREST, PRICE'S VALLEY.

Price's Valley lies between Kaituna Valley and Little River, and contains one of the few remnants of lowland forest still existing in a state of good preservation, and probably the best stand of black and white pine now to be found on the peninsula. Since publication of the previous paper* opportunity has been found of examining more closely than heretofore the vegetation of this valley. We are thus enabled to form a better picture of the original lowland forest of Banks Peninsula.

The Banks Peninsula Botanical Subdistrict might be defined in many ways. Thus a sufficient discrimination of it would be a district in which *Alectryon excelsum* and *Olearia fragantissima* occur together; but, though this would separate it probably from all other forest areas of New Zealand, the description would be of little value to the botanist, as *Olearia fragrantissima* is a rare and disappearing species. One might rely, however, on other species for a separation. It is doubtful, for example, whether the following species could be found commonly together elsewhere—*Nothopanax anomalum, Teucridium parviflorum, Pseudopanax ferox*—as they can be in the district between Gebbie's Pass and Little River. Again, Banks Peninsula might be defined as being characterized by the presence of certain northern species and the absence of others. Thus the following species might be expected to occur and do not: *Cordyline Banksii, Melicope ternata, Olea Cunninghamii.* Their absence separates the forest here from that on the Kaikoura coast, which it most nearly resembles; and the presence of the karaka and the nikau-palm distinguishes it from the tree-clad districts farther south. From these and from other similar considera-

* *Trans. N.Z. Inst.*, vol. 51, p. 355, 1919.

tions it becomes clear that the forest of Banks Peninsula is sufficiently characteristic to be regarded as a separate sub-area. It is so considered by Cockayne in his *Vegetation of New Zealand* (p. 138).

At present, however, owing to the almost complete destruction of the original plant covering by fire, and in other ways, it is difficult to find means for reconstructing in imagination the original plant associations. Fortunately, in Price's Valley there is still a remnant of the primitive forest left on the valley-floor, through which neither fire nor sawmill has been, though, unfortunately, stock have run in it; and there is also a portion of the same forest at the head of the valley at an altitude of 1,500 ft. and upwards. We know of no other place on the peninsula where fragments of the lowland and upland forest are left in a state of such good preservation in the same valley. This enables us to confirm more definitely certain conclusions regarding the forest, arrived at tentatively before.

From this area it appears that the large trees on the valley-floors of the peninsula were chiefly black and white pine with a comparatively small admixture of totara. As the valley narrowed the black and white pines were replaced by totara, which constituted the chief timber-tree of the hillsides. Above 1,500 ft. *Podocarpus totara* became rarer, and plants of *P. Hallii* appeared, and soon predominated. At the same altitude occasional plants of *Libocedrus* were to be found. In the valley referred to there is a great break, however, in the forest between about 200 ft. and 1,000 ft., where now nothing but second growth occurs, so that the changes cannot be followed in detail.

In the lower forest there is a great variety of shrubs, including such plants already mentioned as are elsewhere rare in company—*Teucridium*, *Pseudopanax ferox*, *Nothopanax anomalum*, *Melicytus micranthus*. Several specimens of *Olearia fragrantissima* were observed at a somewhat higher altitude. *Pseudopanax ferox* is replaced by *P. crassifolium* below 1,000 ft., and *Rubus australis* becomes much more abundant, while the huge lianes of *R. cissoides* are no longer to be seen. The point where the kahikatea originally passed out of the forest cannot now be determined, but probably it was below 1,000 ft. Above this the forest takes on the characteristics of the totara association described in the previous paper.

II. PLANTS TO BE ADDED TO THE LIST OF EXISTING SPECIES.

FERNS (FILICES).

Hymenophyllum demissum Swartz.
Bush at the head of the Kaituna Valley on Mount Herbert: A. W.

Trichomanes humile Forst.
Edge of stream, Paua Bay: R. M. L.

Alsophila Colensoi Hook. f.
Price's Valley, common in the bush above 1,500 ft: R. M. L. Head of Stony Bay: W. M.

Hypolepis distans Hook.
Near Akaroa: W. M.

Blechnum Banksii Hook. f.
Akaroa Lighthouse: A. W.; L. C. Stony Bay: W. M.

Blechnum vulcanicum Kuhn.
Grehan Valley, Akaroa: W. M. Mount Pleasant, Lyttelton: A. W.

Pteris tremula R. Br.
Peraki Reserve, Little Tikao Bay: W. M.!

Asplenium bulbiferum Forst. var. *tripinnatum* Hook. f.
Takamatua, Waikerikikeri, Brasenose: R. M. L.

Polystichum capense J. Sm.
Wainui, common in Grehan Valley: W. M.!

Nephrodium velutinum Raoul.
Akaroa, Wainui, Price's Valley: R. M. L.

Polypodium Cunninghamii Hook.
Near the stream Paua Bay: R. M. L. I was pleased to get this, as it is another plant to be added to the list of those reaching their southern limit on Banks Peninsula.

For other species of Filices said to have been gathered by Mr. D. G. Riches on Banks Peninsula, see Martin, *Trans. N.Z. Inst.*, vol. 52, p. 315. As Riches is known to have received many species from the North Island, the evidence of his herbarium is to be accepted with reservation.

Family GRAMINEAE.

Agrostis parviflora R. Br.
Bush and base of rocks, Mount Herbert: A. W.

Deyeuxia Petriei Hack.
High grassland, Mount Herbert: A. W.

Deyeuxia avenoides Buch.
Mount Herbert: A. W. The type and var. *brachyantha* are both abundant.

Danthonia nuda Hook.
Mount Herbert, 1,500 ft. and upwards: A. W.

Danthonia semiannularis R. Br. var. *setifolia* Hook. f.
Rocks above Purau, east side, 2,000 ft.: A. W.

Danthonia semiannularis R. Br. var. *nigricans* Petrie.
South and west slopes of Mount Herbert, near summit: A. W.

Koeleria Kurtzii Hack.
Mount Herbert from 2,000 ft. to summit, Port Hills: A. W.

Poa Lindsayi Hook f.
Saddle Hill, Redcliffs Spur: A. W.

Poa Kirikii Buch.
Mount Herbert: A. W.

Poa anceps Forst. f.
Mount Herbert, near the summit: A. W.
Professor Wall has grown this at Fendalton, and at this low level it maintains its characteristics, and shows no tendency to revert to *P. caespitosa.*

Festuca rubra Linn.
This very difficult species should have been included in the previous list. It is not uncommon in pastures, and perhaps is only a form of *F. novae-zelandiae* (Hack.) Cockayne. A distinct form occurs on the south and west faces of Mount Herbert near the summit (Kaituna side).

Family CYPERACEAE.

Carex Solandri Boott.
Bush, Mount Herbert: A. W.

Carex testacea Sol. ex Boott.
Redcliffs Gully: A. W. Akaroa: R. M. L.

Family JUNCACEAE.

Juncus prismatocarpus R. Br.
Ditch by the side of the road, Kaituna Valley. Motueka Valley is the southernmost locality given by Cheeseman, but it occurs at least as far south as Peel Forest: R. M. L.

Family LILIACEAE.

Bulbinella Hookeri Benth. & Hook.
Summit Road at head of Le Bon's Bay: W. M.

Dianella intermedia Endl.
I was surprised to find a few drought-stricken specimens of this plant in a cleft on the rocks on the northern face of Marley's Hill (May, 1922): R. M. L. On rocks, Charteris Bay: Orton Bradley.

Family POLYGONACEAE.

Muehlenbeckia ephedrioides Hook. f.
It is perhaps worth while putting this on record; though not strictly a Banks Peninsula plant, yet it occurs close to the foot of the hills. Outlet to Lake Forsyth: W. M.; R. M. L.

Family RANUNCULACEAE.

Clematis marata Armstr.
Amongst manuka scrub, Charteris Bay: Orton Bradley!

Family ROSACEAE.

Geum parviflorum Smith.
Rocks on the south side of Mount Herbert, near the summit: A. W. Another addition to our subalpine flora.

Family VIOLARIEAE.

Melicytus micranthus Hook. f. var. *microphyllus* Cheesman.
Price's Valley, on the flat; one plant only seen: R. M. L.

Family RUBIACEAE.

Nertera setulosa Hook. f.
Mount Herbert, 2,500 ft.: A. W.

Family Compositae.

Gnaphalium Traversii Hook. f.

Bog near the top of Castle Hill. This is now to be added to the list of subalpine species: R. M. L.

Senecio Lyallii Hook. f.

Mount Herbert, south side, about 2,800 ft.: A. W. An unexpected subalpine plant.

Taraxacum magellanicum Comm.

Mount Herbert, near summit, both sides: A. W.

CRITICAL SPECIES.

Myosotis australis R. Br. var. *lytteltonensis* (Laing and Wall) var. nov. (Text-figs. 1–3.)

Ramis decumbentibus vel prostratis, crassioribus, rachide multo-breviore quam in forma typica; stylo filiformi gracili, aequanti corollae tubo in longitudine, nucellis maturis nigris nitentibus, leviter ochratis vel fulvis, non subferrugineis.

In the previous list was mentioned among the critical species a form of *M. australis* with the habit and external appearance of *M. Forsteri*. It seems sufficiently distinct and local to require a varietal name. The following is a somewhat fuller description:—

Plant biennial. Stems branched from root, decumbent or prostrate or ascending at tips, stout and scarcely flaccid, 6–18 in. long, hispid with straight or more or less appressed hairs, lower leaves on rather stout petioles 2–3 in. long, petiole 1–2 in. long, sheathing at base; blade 1–2 in. long, oblong to spathulate, obtuse or apiculate, rather membranous, margins and midrib hispid, and both surfaces hispidulous. Racemes somewhat elongated, pedicels $\frac{1}{20}$ in. long, rather stout, many-flowered. Flowers white, or white with yellow eye, $\frac{1}{4}$–$\frac{1}{3}$ in. long, $\frac{1}{4}$ in. in diameter. Calyx tubular in flower, becoming campanulate in fruit, hispid with spreading sometimes hooked hairs, five-lobed to beyond middle, lobes linear to linear-lanceolate acuminate. Corolla-tube funnel-shaped and nearly twice length of calyx, throat with five scales; lobes short, rounded. Anthers included, their tips barely equalling corolla-scales. Style much longer than calyx and equalling corolla-scales. Nutlets ovoid not orbicular, length about $1\frac{1}{2}$ times breadth, when ripe shining-yellowish or greyish-black—not pale brown.

The plant has much more resemblance to *M. Fosteri* than to *M. australis* in its exterior appearance; but in the details of its structure it comes much nearer to the latter. It differs from *M. australis* in being decumbent or prostrate, in the much less elongated rachis, in the long style, and in somewhat lighter colour of the nutlets.

From *M. Forsteri* it differs in being much stouter and stiffer, in the calyx being divided nearly three-quarters of the way down, in the elongated corolla, the shape of the nutlets, and perhaps also in their colour. It apparently bears considerable resemblance to *M. australis* var. *conspicua*, which, however, is unknown to us.

Hab.—Cliffs above Lyttelton, Governor's Bay, and Sumner Road.

Anisotome Enysii (T. Kirk) Laing.

We can find none but trivial differences between this and the Castle Hill plant. In the Banks Peninsula form the bracts are rather narrower. longer, and more acute, and nearly connate.

Myosotis australis var. *lytteltonensis* n. var.

FIGS. 1, 2.—Parts of plants; half natural size. FIG. 3.—Section of flower.

ERRATA.

The following species were admitted into the previous paper in error, and the names should therefore be deleted from the list.

Cyathea Cunninghamii Hook. f.

The plant from Cooper's Knobs is no doubt *Hemitelia.* However, I have reintroduced the species for a plant from Peraki Reserve, on the authority of Dr. Holloway. This has the complete indusium of *Cyathea.* —R. M. L.

Festuca multinodis Petrie.

No form of *Festuca* in this neighbourhood is anything like Petrie's plant, which is very distinct. Very few individuals of *F. novae-zelandiae* have even three nodes.—A. W.

Scirpus antarcticus Linn.

Is recorded in error for *S. aucklandicus* Boeck, by which it should be replaced.

Carex flava Linn. var. *cataractae* R. Br.

I have recorded this from Castle Rock; but I find on examining my herbarium again that there is possibly a mistake in the locality. The species should therefore be removed from the list, pending confirmation of the locality.—R. M. L.

Libertia grandiflora Sweet.

This is probably only a form, though a distinct form, of *L. ixioides.*

Plantago spathulata Hook. f.

This is an erroneous identification of *P. Raoulii* Decaisne.

A Chemical Investigation of Pintsch Oil.

By H. J. Finlay, M.Sc., Edmond Fellow of Otago University.

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It is well known that the cracking of saturated oils leads to very complex products, which are generally highly unsaturated and very volatile. The gases obtained are of high illuminating-power, and have long been used by various railway companies for this purpose. In New Zealand, kerosene (density 0·860), on cracking, yields such a gas, which is known as Pintsch gas, and at the same time a quantity of tarry matter, and the gas itself on compression into the storing-cylinders deposits a surprisingly large amount of water and a considerable amount of a crude light oil which may be appropriately designated Pintsch oil. At present the only commercially important product of this cracking is the illuminating-gas, the only use to which the Pintsch oil is put being in carburetting gases of low illuminating-power, and to a slight extent in preventing napthalene from crystallizing in gas-pipes. Apart from this it is practically wasted, and, as about 15,000 gallons are produced annually, it becomes a matter of commercial importance to find some use for it.